PRO-Soft QA-510
User Manual

SpO2 Analyzer

METRON

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Manual Revision Record

This record page is for recording revisions to your *PRO-Soft QA-510 User Manual* that have been published by METRON or its authorized representatives. We recommend that only the management or facility representative authorized to process changes and revisions to publications:

- make the pen changes or insert the revised pages;
- ensure that obsolete pages are withdrawn and either disposed of immediately, or marked as superseded and placed in a superseded document file, and;
- enter the information below reflecting that the revisions have been entered.

Rev No	Date Entered	Reason	Signature of Person Entering Change
0	-	Initial Release	

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1. About PRO-Soft QA-510

1.1 Introduction

Pulse Oximetry is a state-of-the-art, non-invasive method to determine the percentage of a patient's oxygen saturation (SaO_2) without having to obtain an arterial blood specimen. The instrument used for this determination is a pulse oximeter. An oximeter measures the changes in the intensity of transmitted light as blood pulsates through a patient's finger or earlobe. From this data, the pulse oximeter does mathematical calculations to determine the percentage of oxygen saturation of the blood.

METRON's QA-510 SpO_2 Analyzer is a precision instrument for testing these oximeters, and is designed for use by trained service technicians. It allows the user to:

- Simulate a variety of environmental and patient conditions.
- Measure a pulse oximeter's infrared and red LED.
- Check the pulse oximeter's ability to generate an alarm when SpO_2 or heart rate exceeds specified limits.

Testing with the QA-510 is usually a matter of setting up the preferred simulation parameters. Using PRO-Soft QA-510 simplifies the process by providing an all Windows-based environment through which simulation parameters are created by the user and sent to the QA-510 unit. This in turn activates the corresponding simulation state through the QA-510 Finger.

1.2 PRO-Soft QA-510 Testing

PRO-Soft QA-510 performs tests based on user generated test sequences and checklists. With the sequence tests you can perform simple or complex tests, including both the single and alarm limits test modes, can be created and executed semi-automatically.

Test results are entered on the screen during testing. At the conclusion of testing the user may print a report, store the tests and results on disk, or both. Combinations of tests can be created and stored as "sequences." PRO-Soft QA-510 maintains a library of these sequences. In this way the user can store and retrieve sequences that are appropriate for the kind of equipment being tested.

Sequences can then be used independently, or can be attached to a checklist, written procedure, and equipment data in the form of a test

"protocol." The equipment data can be entered manually into the protocol, or it may be retrieved by PRO-Soft from other equipment files. Protocols with test results can be printed, or stored on disk. Also, the results of testing can be sent to other equipment maintenance management programs, to close a work order and update the oximeter's service history.

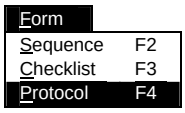
1.3 About your Manual

This manual is designed to assist you in the basic procedures for creating test protocols with PRO-Soft QA-510. It also covers all features resident in the full PRO-Soft program.

Familiarity with Microsoft Windows and its features is assumed. If you are unfamiliar with it, we recommend that you use your *Microsoft Windows User's Guide* along with this manual.

This manual contains the following standardized text formatting conventions:

This	Represents
Bold title case	Menu items and control buttons that can be selected to perform operations. The underline (_) represents the shortcut key. For example, "**Select File**, **Save**" instructs you to press "**File,**" then press "**Save.**" The comma (,) between selections indicates that both selections are to be made in sequence.
< braces >	Text information that must be specified and entered by the operator.
CAPITALS	File names and paths. For example, "QAMDAT.50"
	The menu under discussion



1.4 Updating PRO-Soft Program Files

Occasionally, updated versions of PRO-Soft QA-510 program files are posted on METRON's Website at http://www.metron-biomed.com. These can be downloaded through file transfer procedures. Registered users should contact their local METRON representative for more information regarding updating.

2. Getting Started

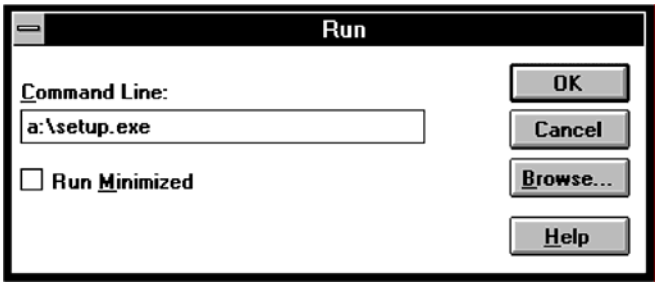
2.1 System Requirements

The following are the minimum requirements for installation:

- IBM PC/XT-compatible machine, 80486 SX 25 MHz or higher.
- A 3.5" floppy drive.
- An EGA, VGA, 8514, Hercules or compatible display (recommended: VGA).
- 8 MB of RAM.
- 1 MB of unoccupied hard disk space, plus 3 MB of free space on the drive contained the WINDOWS:\SYSTEM directory.
- Microsoft Windows version 3.11 or later version.
- Metron QA-510.
- RS-232 cable (null modem/data transfer configured).
- Printer for reports. (MS-Windows compatible)

2.2 Installing PRO-Soft

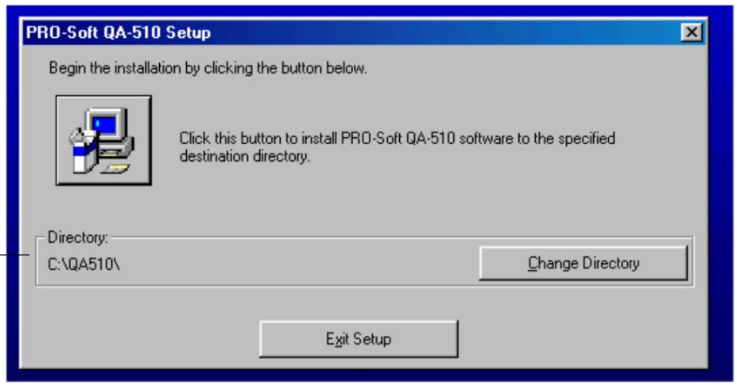
1. Start Windows.
2. Insert the PRO-Soft QA-510 install disk # 1 into drive A (or B) or insert the PRO-Soft CD into your CD drive.
3. Select **Run** from the File Menu in the Windows Program Manager. (In Win 95, click the **Start** button and then select **Run**.)



4. Type <drive>**:**\setup. Then, click the **OK** button. If you are installing PRO-Soft QA-510 from a CD, server or shared directory, type the full path plus setup**.**

5. When setup starts, the following dialog box will appear. Type in the desired drive and directory for PRO-Soft QA-510, and then click the **Continue** button.

If you are installing PRO-Soft QA-510 for the first time, we recommend using the default drive, directory, and program group (C:\QA-510)


PRO-Soft QA-510 Setup
Begin the installation by clicking the button below.
Click this button to install PRO-Soft QA-510 software to the specified destination directory.
Directory:
C:\QA510\
Change Directory
Exit Setup

6. After setup is completed, a program group will be created in the Windows Program Manager called "PRO-Soft QA-510," or another name you provided during installation.

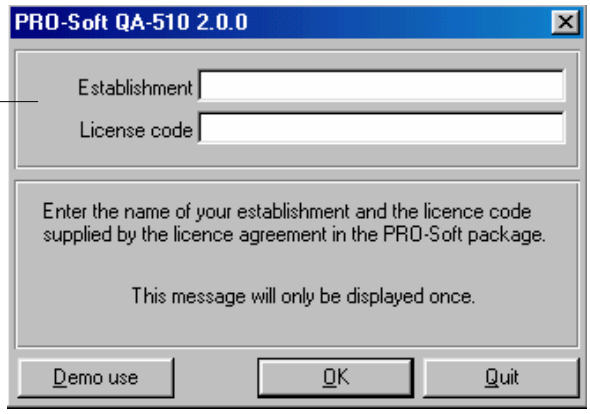
7. Remove the last disk or CD and store the installation disk(s) in a safe place.

2.3 Initial Startup

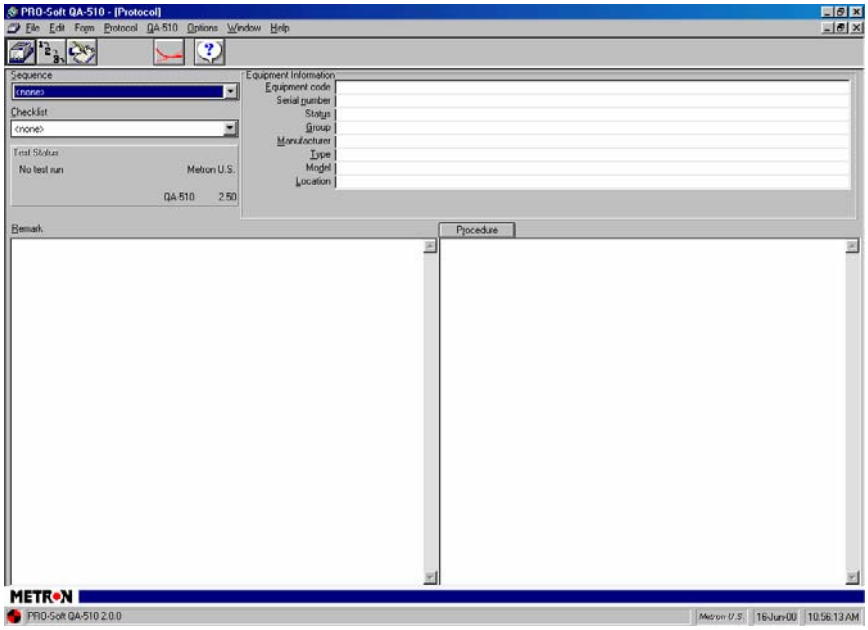
The first time that PRO-Soft QA-510 is run, information has to be entered, and the program configured for further use.

1. To start the program, double-click on the QA-510 icon.
2. The following dialog box will appear. Enter the **Establishment** (license holder) name, and the **Code** (alphanumeric license number) exactly as written on the license agreement supplied:

Be careful to enter the name and code exactly as written on the license agreement. This screen is case sensitive.

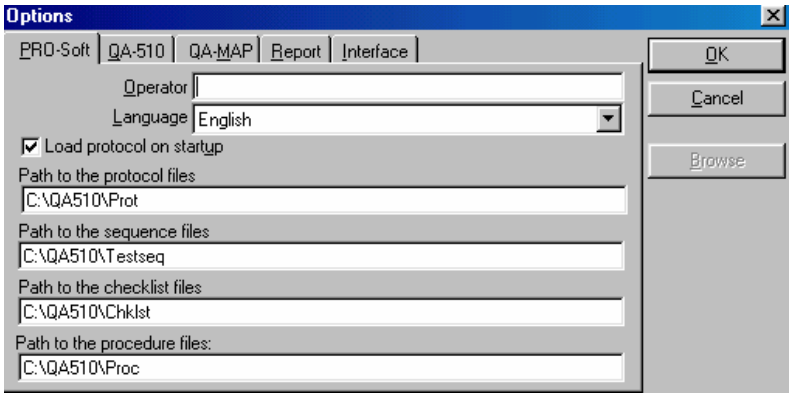

PRO-Soft QA-510 2.0.0
Establishment
License code
Enter the name of your establishment and the licence code supplied by the licence agreement in the PRO-Soft package.
This message will only be displayed once.
Demo use
OK
Quit

3. When you click the **OK** button the PRO-Soft QA-510 main application window is displayed:



2.4 Option Settings

To configure program parameters click the **Option** Menu, then click **Edit Options**. The following five-card dialog box appears:



Options
Edit Options

In the topmost section of this box there are five tabs: **PRO-Soft**, **QA-510**, **QA-MAP, Report,** and **Interface**. By clicking one of these tabs, its corresponding card will be displayed, containing the settings available for the item described on the tab.

After editing the option settings press **OK** to save changes, or **Cancel** to discard them. When a <Path> text box is highlighted the **Browse** button will also be available and, by pressing this button, a file window will be displayed where you can select the appropriate path.

1. **PRO-Soft Tab**. This tab provides basic identification of the facility and operator of the test equipment, as well as pathing directions for the PRO-Soft program in order for it to function. The configuration parameters and their descriptions are:

Operator:	The name of the person who is executing the tests.
Language:	Language used for commands and menus in PRO-Soft QA-510.
Path to the protocol files:	Default path to the files where the test protocols are stored.
Path to the sequence files:	Default path to the files where the test sequences are stored.
Path to the checklist files:	Default path to the files where the test checklists are stored.
Path to the procedure files:	Default path to the files where the test procedures are stored.

The operator and establishment settings, once made, become the default settings, and appear automatically in the headings of

printed reports. To change the defaults, enter a new operator or establishment and save by pressing **OK**.

2. **QA-510 Tab**. This tab is used for three things. Setting the communications port (COM1-4) to be utilized for initiating the QA-510 remote setting at start-up. Once entered, it becomes the default setting. To enter the serial number and firmware version of the QA-510 utilized for testing. Once entered, it becomes the default setting, and appears automatically in the headings of printed reports. To change the default, enter a new serial number and save by pressing **OK**.

3. **QA-MAP Tab**. Most QA-MAP interaction control settings included in the PRO-Soft options may be changed during the execution of the PRO-Soft QA-MAP Program[1]. However, the following default settings are only available through the PRO-Soft QA-510 options menu:

Path:	Path to the QA-MAP file QAMDAT.MDB.
List Equipment Codes:	Controls whether the equipment list window or the equipment code text box window opens in the fetch operation.
Fetch from QA-MAP: **- Appliance data** **- Sequence** **- Procedure**	Sets the defaults as to the types of information extracted from QA-MAP.

Once entered, these become the default settings. To change them, enter new setting and save by pressing **OK**.

4. **Report Tab.** This tab is for setting the alignment of the printouts for the test reports.

5. **Interface Tab**. This tab is used to configure the PRO-Soft program by setting the input and output data files to be used when interfacing with external programs. Once entered, it becomes the default setting. To change the default, enter a new COM Port and save by pressing **OK**.

[1] Available separately from your Metron Representative.

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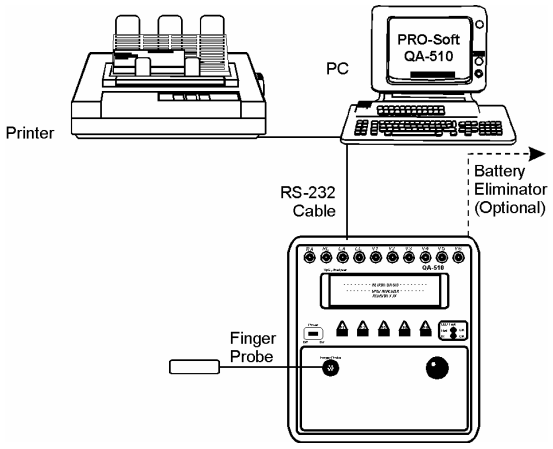
3. Testing Setup

Communication between the PRO-Soft QA-510 and the QA-510 is based upon an RS-232C interface, that is standard on most modern personal computers. The operation is essentially a “master-slave” configuration, whereby the computer operates the QA-510.

3.1 Equipment Setup

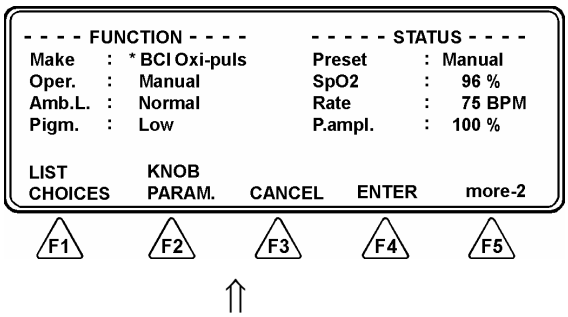
Attach an RS-232 (null modem/data transfer configured) cable to the 9-pin D-sub outlet port located at the rear of the QA-510. Do not attach the printer cable to the QA-510. *See below*.

NOTE
Some RS-232C cables do not have any connection between the seventh and the eighth wires in the cable. The cable may still be called a NULL-modem, but it will not work with the QA-510.

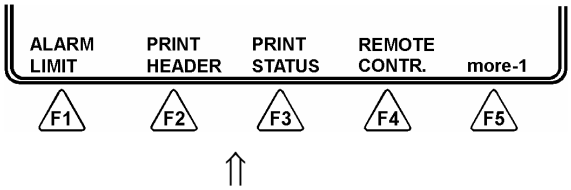


3.2 Initializing Remote Control

1. Before initiating remote control, ensure that:
   - the RS-232C cable is securely connected to the communication ports on the QA-510 and your computer, and;
   - the proper communications port has been assigned.
2. With the QA-510 switched **ON**, advance to the Second Main Menu Bar by pressing **more-2 (F5)**:



3. Press **REMOTE CONTR. (F4)** to initiate remote control.



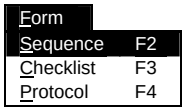
4. Communication will be established when testing or downloading of presets start.

4. Sequence Testing

Sequence testing enables you to perform multiple tests semi automatically. Instead of manually setting up and running one test at a time, a sequence of several tests that you desire to perform can be set up in advance of testing. Once a sequence is created you can save it for later retrieval and reuse.

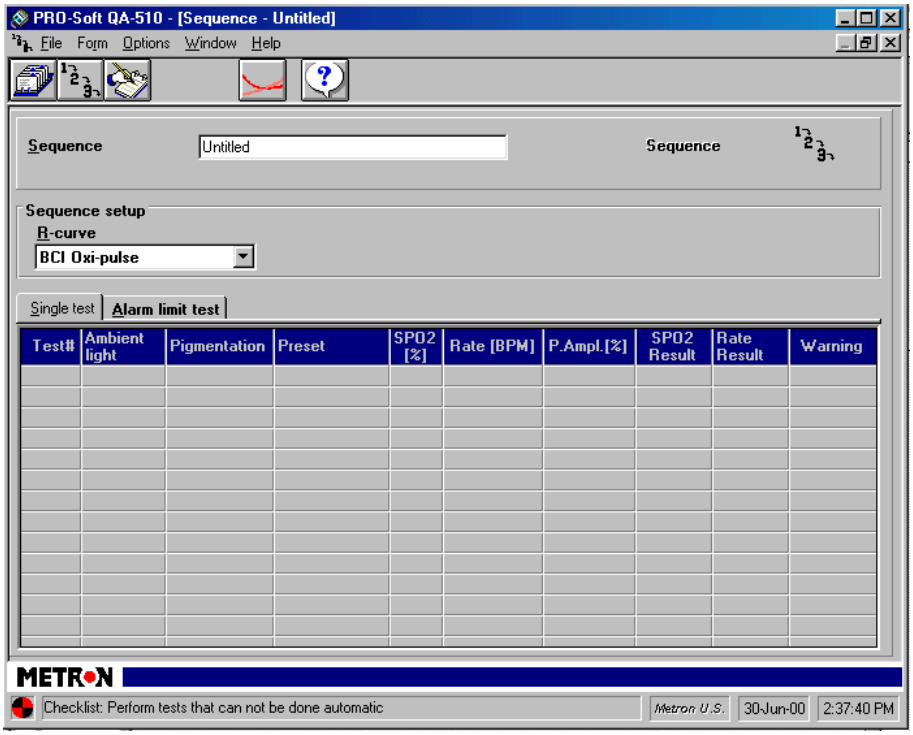
Up to 50 different tests can be run in each sequence. There are no restrictions on how the sequence is composed.

4.1 Sequence Form Window



From the PRO-Soft QA-510 Main Menu select **Form, Sequence**, or **Form, Protocol, View Sequence** and the Sequence Form Window appears. The window displays a Control Field and two tabs: **Single test** and **Alarm limits test.**

Each table row contains information for one test. Each column contains different parameters that can be selected to perform the tests.



1. **General parameters**

Sequence	The name of the sequence.
R-Curve	The oximeter probe manufacturer from the pre-loaded or user-defined R-curve listing.

2. **Sequence parameters**

Test #	The test in sequential order.
Ambient light	The ambient light setting, which simulates motion, ambient sunlight, and 50 Hz or 60 Hz artificial light interfering with the pulse oximeter's probe.
Pigmentation	The pigmentation setting (low, medium, high)
Preset	Simulated patient conditions. Default is Normal.
SpO_2 [%]	The O_2 saturation level. Range is 30% - 100%.
Rate [BPM]	The pulse rate. Range is 30-250 BPM.
P.Ampl.[%]	The pulse amplitude level. Range is 0% - 100%.
SpO_2 Result	Key in the test result form your Pulse Oximeter
Rate Result	Key in the test result form your Pulse Oximeter
Warning	Key in the test result if the alarm triggered

2. **Alarm Limits Test parameters.** Information is contained in this tab is for running alarm limits tests.

Test #	The test in sequential order.
Ambient light	The ambient light setting, which simulates motion, ambient sunlight, and 50 Hz or 60 Hz artificial light interfering with the pulse oximeter's probe.
Pigmentation	The pigmentation setting (low, medium, high)
Test Parameter	The value simulated by the QA-510 unit. Select from **Pulse, SpO_2, Rate, P.Ampl.**
ALT Result	Alarm Test Result
Warning	Key in the test result if the alarm triggered

4.2 Sequence Setup

When the Sequence Window is opened the first test parameters for **Make**, **Amb.L.** and **Pigm.** are set automatically so that, when new tests are added to the sequence, these parameters are copied automatically to them. To modify or change these parameters, as well as any other test parameters, click the field and manually enter the value and press **Enter** or select from the drop down list of choices, as appropriate.

1. **Single Test Setup**:
   a. Set the **Make**, **Amb.L.** and **Pigm.** parameters.
   b. Select one of the preprogrammed **Preset** states, or set **SpO_2, Rate** and **P.ampl.** manually.

2. **Alarm Limits Test Setup**:
    a. Set the **Make**, **Amb.L.** and **Pigm.** parameters.
    b. Select the **Test Parameter** (SpO_2, Rate or P.ampl.

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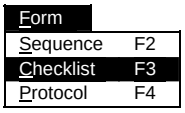
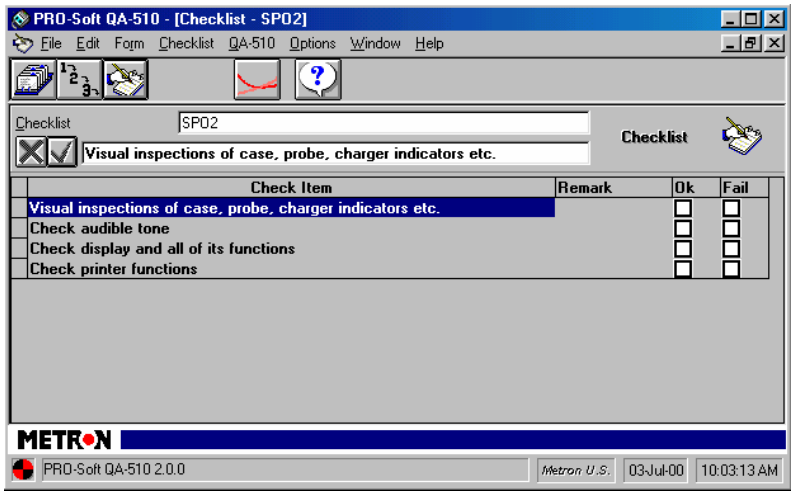
5. Checklists

The checklist adds manually or visually performed tests and function checks to the protocols *(see Chapter 7)*. Once created, a checklist can be edited, stored and retrieved for future use.

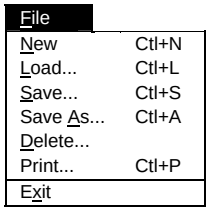
5.1 Checklist Form Window



From the PRO-Soft QA-510 Main Menu select **Form, Checklist**. The Checklist Form Window then appears *(see below)*. It is a table allowing for up to 30 lines, where each line contains a description of what to examine (up to 50 characters). Each line also has two check boxes, 'Pass' and 'Fail,' to be used when examining the infusion pump.



5.2 Checklist Files Man-



1. **New Checklist**. Select **File, New**. The current checklist window clears and initializes a new checklist form. If you already have an active checklist containing unsaved changes, a dialog box appears. It prompts you as to whether or not you want to save the changes, discard them, or abort the operation and return to the active checklist.

2. **Loading and Saving Checklists**. To save the active checklist, select **File, Save** or **File, Save As**. The **Checklist Library** window will open *(see below)*, prompting for a name to use for the checklist. To retrieve, select **File, Load** and select among the available checklists:

3. **Printing Checklists**. To print a checklist, select **File, Print**. Then, select whether to print the checklist, or write it to a file.

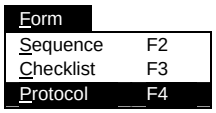
6. Protocols

Protocol contains a description of the oximeter being tested, and specifies an associated test sequence and checklist. It also includes a procedure file, stating special concerns for each oximeter.

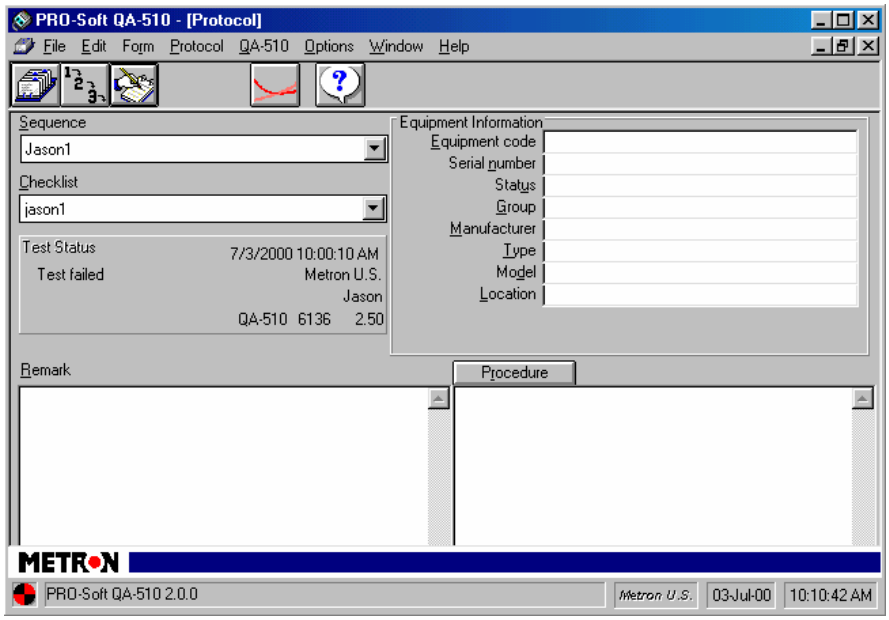
When saved, the results are added to PRO-Soft 510's Protocol Database, or to QA-MAP, if installed. This database is an historical record of those protocols for which safety tests have been done with PRO-Soft. Information stored includes the:

- Tested oximeter's equipment code and serial number
- Test sequence used in the test
- Date the safety test was executed
- Status of the test (OK, Failed)
- Protocol filename containing the test results.

6.1 Protocol Form Window



From the PRO-Soft QA-510 Main Menu select **Form, Protocol** and the **Protocol Form** window appears:



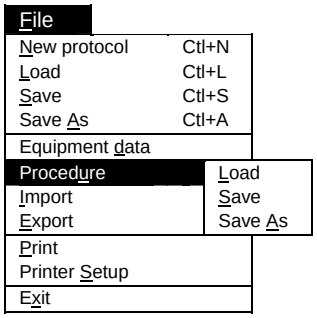
The Protocol application window contains the following fields:

1. **Equipment Information** Field. This field contains text boxes that are used to describe the oximeter under test, and are also used in the safety testing report to document the test of a particular oximeter. The text boxes, each containing space for up to 30 characters, are:

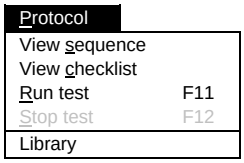
Equipment code:	The equipment identifier
Serial number:	The equipment serial number
Status:	The equipment status
Group:	The equipment group
Manufacturer:	Manufacturer of the equipment on test
Type:	The equipment type
Model:	The equipment model
Location:	Location of the equipment on test

   PRO-Soft can load equipment information already entered in an ASCII text file or, if you have PRO-Soft QA-MAP installed, from that program. *See paragraph 7.4.*

2. **Remark** Field. This field is for inserting remarks on the test. The remark may contain up to 300 characters long, describing special events that may have occurred during the testing. Any testing anomalies peculiar to the equipment under test, or on the testing itself, should be entered in this box.



3. **Procedure** Field. This field is for detailing the testing procedure used. For example, it can be a description of how to connect the QA-510 to the instrument under test. Procedure is always saved to a separate text file (*.txt). It can be created and edited by typing the information in the procedure text box or, by using any text editor/word processor capable of saving plain text files (e.g., Windows Notepad). When you select an item in **File, Procedure**, the following dialog box appears where you can specify the file you need by its filename. The title of the dialog box shown depends on whether you select **Load**, **Save** or **Save As**. If you have already saved the procedure, **Save** will store your changes under the filename you specified the first time you saved the file, while **Save As** will prompt you for a new filename.



4. **Sequence and Checklist** Fields. These drop down list boxes contain listings of all sequences and checklists resident in their respective databases. Select which of them PRO-Soft will use to test the equipment described in your protocol. When you have selected a sequence and checklist the menu items **Protocol**, **View sequence** and **Protocol**, **View checklist** become available. When selecting either of these menu items PRO-Soft will load the sequence or checklist and switch to the respective application window, where you may edit it before running the test. If you already have an active sequence or checklist, containing unsaved

changes, a dialog box appears, giving you an opportunity to save the changes.

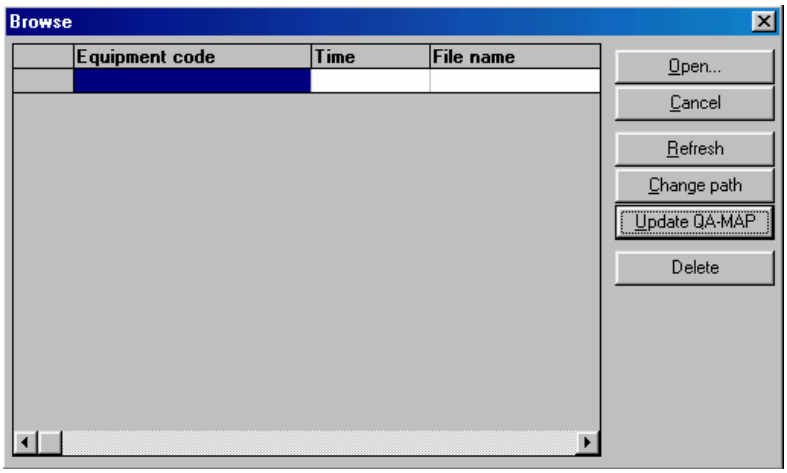
When first opening the protocol application window with a new protocol these fields will be blank, indicating that no sequence or checklist is connected to the protocol. They have to be created and connected to the protocol before they will appear.

6.2 Protocol Database

Protocols are saved and retrieved from the Protocol Database *(see below)*. This database is an historical record of those protocols for which safety tests have been done with PRO-Soft. The information stored includes the:

- Tested oximeter's equipment code and serial number
- Test sequence used in the test
- Date the safety test was executed
- Status of the test (OK, Failed)
- Protocol filename containing the test results.

To access the Protocol Library select **Protocol, Library**. The following dialog box appears:



The **Protocol Database** window contains the following fields:

1. **Equipment Code/Test Time**. These list boxes contain the protocols already added to the database by equipment code and serial number.
2. **File name**. This field shows the file name that the test history is stored in.
3. **Control**. The third field manages the database.

a. **Open** loads the selected protocol into the active protocol window, allowing you to view the safety test results and other information stored in the protocol. If you already have a protocol open in the active window, and this protocol contains unsaved changes, PRO-Soft will not load the protocol selected in the database until you have responded to a dialog box prompting you to save the open protocol.

b. **Delete** removes selected protocol(s) from the library, prompting for confirmation. Clicking **No** prevents deletion. If more than one for deletion is selected, PRO-Soft will leave the current equipment and continue to the next one selected, and display the message for this one.

c. **Cancel** interrupts the entire delete operation. Note that equipment protocols deleted before selecting **Cancel** (or **No**) will not be restored.

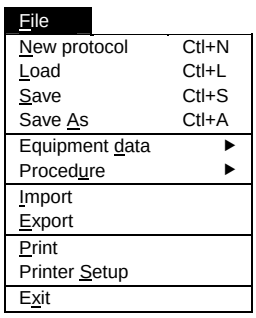
d. **Refresh** is used to update the display.

e. **Change Path** is used to change the path that the files are stored in.

f. **Update QA-MAP** is designed specifically to update METRON's QA-MAP. For this to operate QA-MAP must be installed, and the **QA-MAP** tab in **Options**, **Edit Options** must be configured accordingly *(cf. Paragraph 2.2.2)*. When this button is clicked, PRO-Soft updates QA-MAP's **Test** table with the status of all test results added to the protocol database since the last update operation. Included in the update is the:

- Tested oximeter's equipment code and serial number
- Test sequence used in the test
- Date the safety test was executed
- Status of the test (OK, Failed)
- PRO-Soft program executing the update (i.e., PRO-Soft QA-510)

6.3 Protocol File Management



1. **New Protocol**. Select **File, New protocol**. The system will display an empty Protocol Form window. Fill in the required information and select the test sequence and checklist to use with the oximeter being tested.

   You can open multiple protocols to allow you to compare, for example, this year's and last year's test results. To do so select **Form**, **Protocol**, and then open another protocol window by se-

lecting **File, New Protocol**. Then, select **Window, Tile Horizontal**, so that both forms appear together. To compare the test results load the protocol corresponding to this year's testing into one of the protocol windows, and the protocol corresponding the last year's testing into the other window.

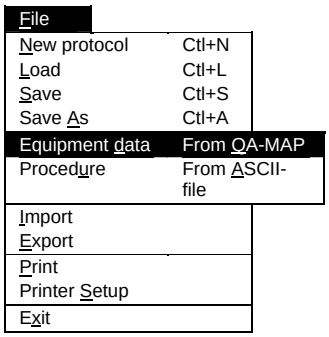
2. **Saving Protocols**. Protocols are saved to the **Protocol Database**. To save the active protocol, select **File, Save** or **File, Save As**. The Protocol Database window will open, and you will then be prompted for a name to use for the protocol.

3. **Retrieving Protocols**. There are two methods of retrieving protocols. One is to select **File, Load** and the other is to select **Protocol**, **Library**. Once the database window is opened, select among the available protocols the one that is desired, and double click to load it into the Protocol Form window.

4. **Printing Protocols**. To print a protocol, select **File, Print.** Then, select whether to print the protocol or write it to a file.

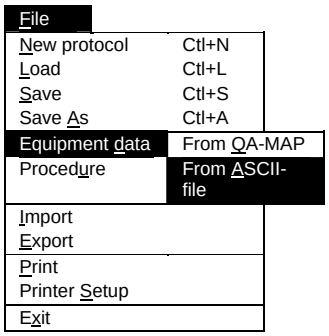
6.4 Importing Data

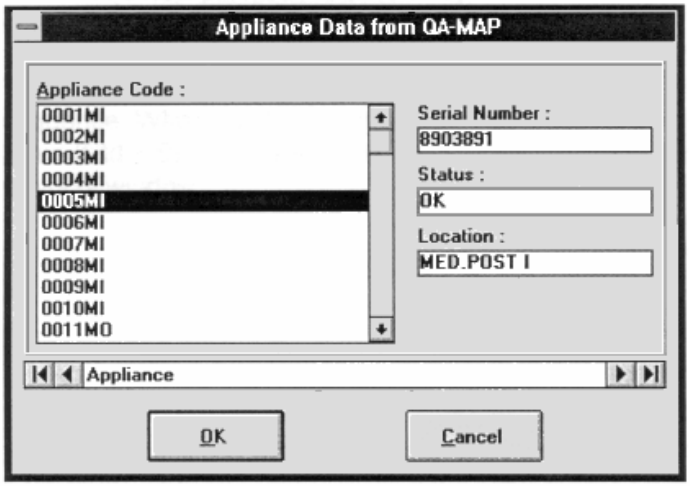
Equipment files pertaining to oximeters in the inventory can be created from ASCII text files, or can be imported into PRO-Soft QA-510 from METRON's QA-MAP program. This appendix details the procedures for these options.



1. **Retrieving from QA-MAP**. Data on the oximeter to be tested can be imported directly from METRON's QA-MAP. For this feature to operate QA-MAP must be installed, and the **QA-MAP** tab in **Options**, **Edit Options** must be configured to reflect **Retrieve Appliance Data**. *(cf. Paragraph 2.2.2).*

   To import the data select **File, Equipment data, From QA-MAP** in the Main Menu.. When the following dialogue box appears, select the appliance code for the oximeter you wish to test and click on **OK**. Information stored in QA-MAP states, which test sequence to use for each oximeter.





2. **Making Protocol Formats from an ASCII Text File**. PRO-Soft can load equipment information from an ASCII text file. ASCII text files can be created on each of the oximeters for which you intend to produce protocol formats. The ASCII file must follow this pattern :

```
EquipCode       =   <Equipment Code>
SerNo           =   <Serial Number>
Status          =   <Status>
Group           =   <Group>
Manufacturer    =   <Manufacturer>
Model           =   <Model>
Type            =   <Type>
Location        =   <Location>
Sequence Name   =   <Name of Test Sequence>
Procedure       =   <Procedure Filename>
```

This file contains information on one oximeter. The text preceding the '=' sign is only for your convenience. The text following the '=' sign is used to construct a protocol format. Make sure that the lines appear in the right order, i.e., appliance code first, ... , procedure text last. Use a text editor or a word processor that can save ASCII text to create the file (e.g., Notepad). To produce protocol formats from the data in the file, select **File, Equipment data, From** ASCII-**file**. Select the file containing the oximeter information and click on **OK**. The program will read the file and add one new protocol format to the database library for each oximeter

7. R-Curves

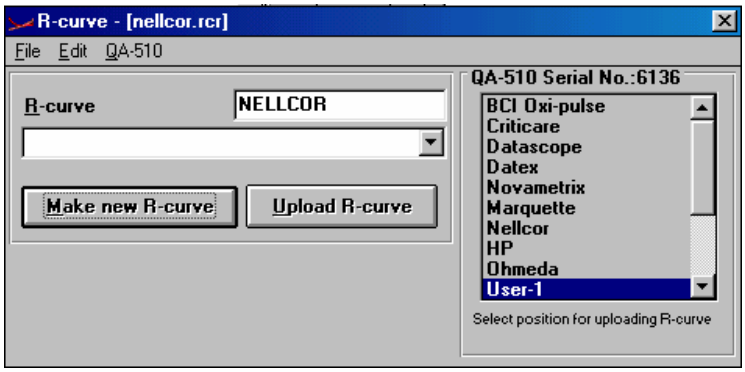
7.1 R-Curve Defined

R-curves specify the relationship between the Red/IR ratio measured by pulse oximeters and the SpO_2 value displayed. These curves are obtained by each pulse oximeter manufacturer during clinical trials. QA-510 has pre-loaded manufacturer's R-curves *(see the Appendix B for a listing).* However, the operator may establish user-defined, or additional manufacturer R-curves, and these can be loaded into the PRO-Soft QA-510, and further downloaded into the QA-510.[2]

7.2 Creating R-Curves

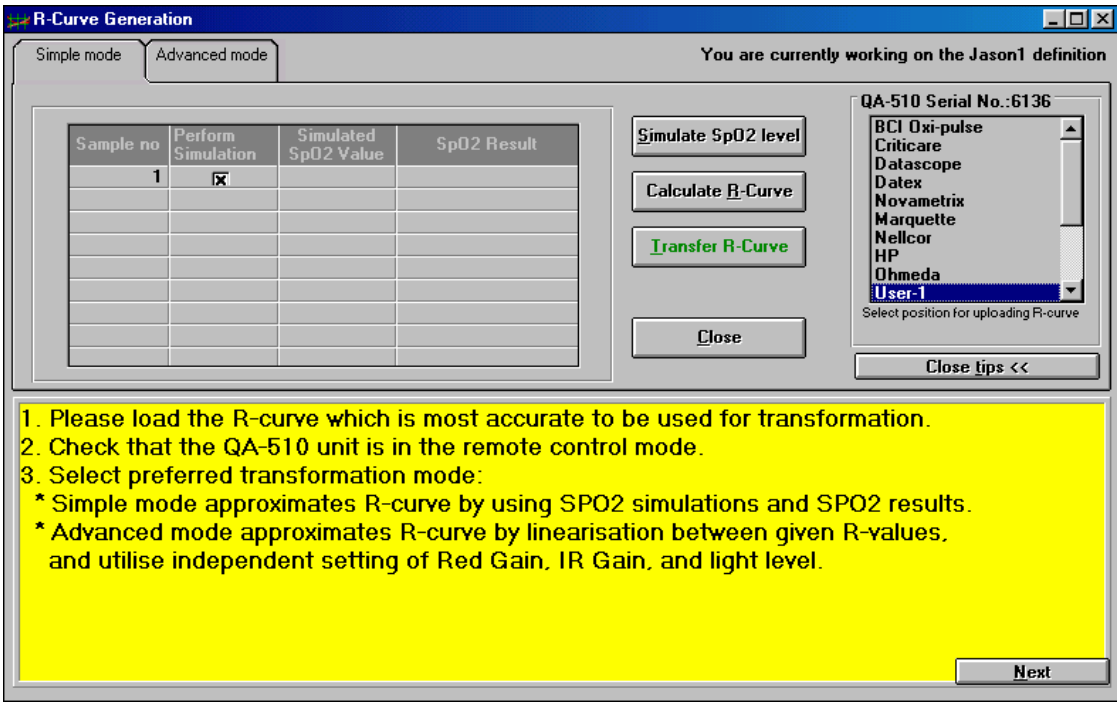
QA-510
R-curve

To enter new, user-defined or factory R-curves, click the **QA-510** Menu, then click **R-curve**. The following dialog box appears:



The form has two fields and a selection box. The upper field is the R-curve name. The lower field is the file containing the R-curve itself. The selection box is where you select the target memory location in the QA-510 to store the R-Curve. The **Make new R-curve** button will take you to the screen below and will use the selected R-curve as a starting point for generation the new R-curve. Pressing **Upload R-curve**, will upload the selected R-curve to the QA-510 into the selected memory slot.

[2] Contact your local METRON Representative for a list of R-curves currently available for download to the QA-510.



The **Simple mode** window contains the following fields and buttons:

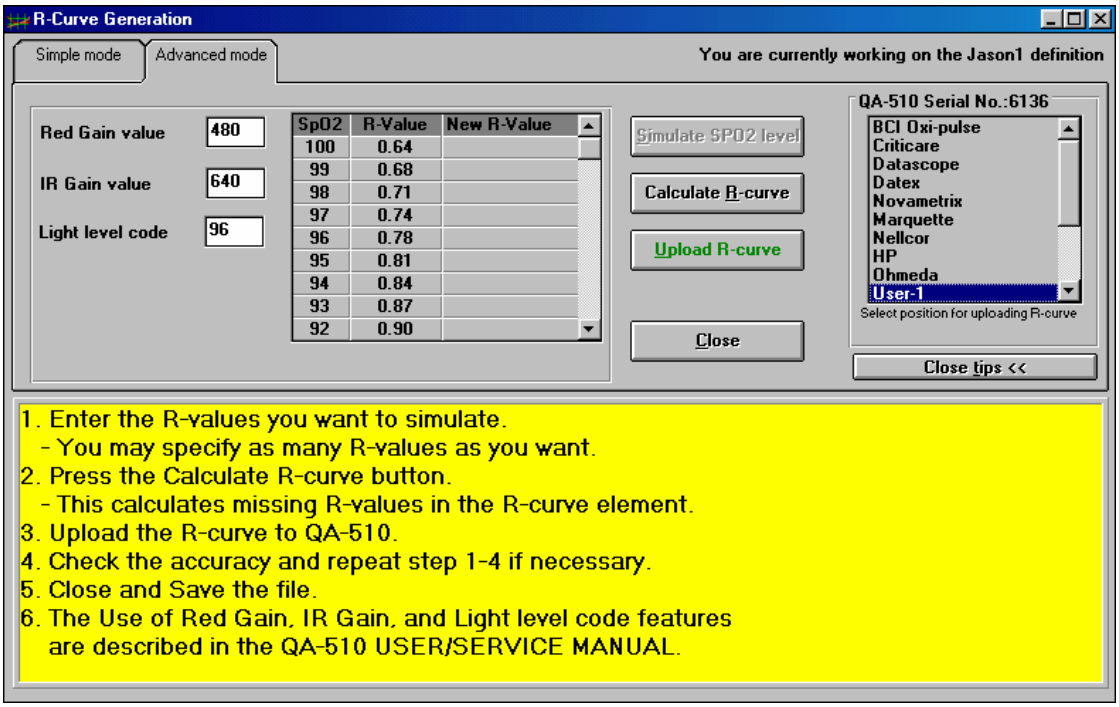
1. **Sample no.** This field is the sample number
2. **Perform Simulation**. This field contains a checkbox. If the box is checked the values will be simulated during the set of simulations.
3. **Simulated SpO_2 Value.** This is the SpO_2 value that you wish to simulate.
4. **SpO_2 Result**. This is the field where you key in the value that is displayed on the SpO_2 meter.
5. **Simulate SpO_2 level.** This button starts the simulation of the selected SpO_2 values.
6. **Calculate R-Curve.** This calculates the new R-curve based on the results from the simulation. The more simulated points that you use the more accurate the R-curve will be.
7. **Transfer R-Curve**. This button is used to upload the R-curve into the memory location in the QA-510 selected in the window on the right.

When the mouse is over the table, you can press the right mouse button to insert additional test values or delete extra values.

In order to generate a valid new R-Curve for use by the QA-510, you must work with a calibrated Pulse Oximeter unit or module, a known good finger probe and a calibrated QA-510.

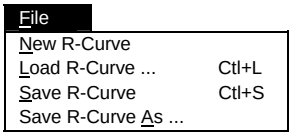
1. Launch PRO-Soft QA-510 on your computer and connect the NULL-Modem cable from the COM port to the QA-510.
2. Turn on the QA-510 and the Pulse Oximeter.
3. On the QA-510, select through the different loaded R-Curves until you find the Make that functions best on the oximeter in question. (This will be the one that displays the closest correlation between simulated and measured values.)
4. At this time you need to place the QA-510 into Remote Operation mode.
5. Within PRO-Soft QA-510, go to the menus at the top of the screen. Select QA-510, then R-Curve. This will open the R-Curve window.
6. In the scroll box you need to select the R-Curve data file that you selected in step #3.
7. In the text box above the scroll box, type in the name for the new R-Curve.
8. Now within the R-Curve window, select "File", then "Save R-Curve As".
   Do not select "Save R-Curve" or you will over write the data for a currently calibrated R-Curve.
9. On the right side of the R-Curve window is a box where you can select the memory position within the QA-510 to upload the new R-Curve to. (The Default is the User-1 slot)
10. Press the "Make new R-Curve" button.
11. You are now in the R-Curve generation window. You will notice that in the upper right hand corner of the window it will indicate which R-Curve file you are currently editing. In the upper left corner you will see two tabs; "Simple Mode" and "Advanced Mode". We suggest you start in simple mode.
12. The table on the screen is where you will set your test points. This is done by selecting a cell in the "Simulated SpO2 Value" column. To add more sample values to the table, right click within the table and select "Insert Row". We suggest testing at 99, 95, 90, 85 and so forth down to the lowest value that your unit should properly display. (The more test points that you use, the more accurate the calculated R-Curve will be.)
13. Once you have all of your test points selected, press the "Simulate SpO2 level" button.
14. Wait for the value on your SpO2 meter to stabilize then type it in the selected "SpO2 Result" box and press "Enter" on your keyboard. This will send the next value to be simulated to the QA-510.
15. Repeat step 14 until all values have been recorded.
16. Press the "Calculate R-Curve" Button.

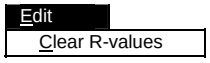
17. Press the “Close” Button. This takes us back to our earlier R-Curve window.
18. Go to “File” and select “Save R-Curve”. This will now save the new R-Curve to your hard drive.
19. Make sure that the desired upload location is selected in the box on the right, then press “Upload R-Curve”. The QA-510 will indicate, “Wait” while the data is uploading. **Do not disconnect the cable or turn off the power on the QA-510 during the download.**
20. Turn the power off on the QA-510. Wait 5 sec and turn the power back on. This refreshes the data in the QA-510.
21. Test the new R-Curve in the QA-510 by selecting the Make that you uploaded.
22. If the values are off go to step #4 and repeat the procedure now using this data file as your starting point. Omit steps #7 and #8.



The **Advanced mode** window contains the following fields and buttons:

1. **Red Gain value.** This field is the gain value for the Red source. Legal values range from 100-2697.
2. **IR Gain value**. This field is the gain value for the IR source. Legal values range from 100-2697.
3. **Light Level code.** This is the appropriate value selected from the table in **Appendix C.** Legal values range from 0-255.





4. **SpO_2 Value and R-Value**. These are the fields where the SpO_2 value and its respective R-value are listed.

5. **New R-Value.** This is where you can enter in a new R-value. Legal Values are 0-2.55.

6. **Calculate R-Curve.** This calculates the new R-curve based on the results from the simulation. The more simulated points that you use the more accurate the R-curve will be.

2. **Transfer R-Curve**. This button is used to upload the R-curve into the memory location in the QA-510 selected in the window on the right.

When you opened **Specify R-curve**, and the R-curve dialog box appeared, the control menu contents also changed. When R-curve operations are completed, and you exit R-curve, the control menu contents revert to that of the main application window.

The **File** menu, shown at the left, allows you to create **New**, or **Load** R-curves already resident in the R-curve directory. Selecting **Save** saves the current R-curve to a file in the R-curve directory. Selecting **Save As** saves the current R-curve to a file in the R-curve directory. The R-curve values in the table can be cleared by selecting **Edit**, **Clear R-Values**. R-Curves can be saved and loaded from the **File** menu.

Once the R-curve is entered transfer it to the QA-510 by either clicking the **Transfer R-Curve** button, or selecting **QA-510**, **Transfer R-Curve** from the main application menu. As the R-curve is being transferred the QA-510 will flash, "**Wait!"** in the lower right part of its display, and the hourglass in the lower left part of the PRO-Soft QA-510 display will start rotating. When the QA-510 stops flashing, "**Wait!**" and the hourglass in the PRO-Soft QA-510 stops rotating, the transfer is complete.

If the QA-510 serial number was entered in the **Options**, **QA-510** tab *(see paragraph 2.3.2)*, PRO-Soft QA-510 will save the name of the R-Curve you just transferred. This enables PRO-Soft to display the correct make while executing tests.

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8. Troubleshooting

Problem	***Possible Solution***
Communication not established between the computer and the QA-510.	Check to ensure that: 1. The QA-510 is set to “Remote Control.” 2. The correct COM-Port is assigned in the Options Menu. 3. The RS-232 cable has a null modem/data transfer configuration.
Test sequence grid will not accept data	Check the tests to be made in the 'Tests' frame.
Reports are not printed	1. Wrong printer driver. Choose the correct printer when running print report. 2. Do not check the print to file box when running print report.
Strange characters in a report	Wrong printer driver. Choose the appropriate printer in the Print Manager program.

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APPENDIX A: AUTO SEQUENCE CODES

A1 Auto Sequence Dialog Box

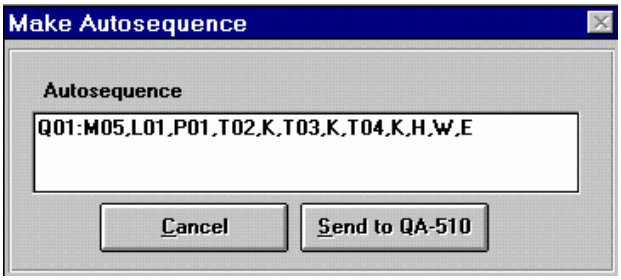
This dialog box (*see figure below*) contains a string of codes, developed from the following tables. Conventions for constructing the string are:

a. There are no spaces between codes in the string.

b. The Load Sequence in position ("**Q**__**"**) is followed in all cases by a colon.

c. Each code inserted is followed by a comma (**","**).

d. The last code is always End of sequence (**"E"**), with no punctuation thereafter.



Description of above auto sequence: Load Auto Sequence in position 01, Make: Novametrix, Ambient light: Normal, Pigment: Low, Preset: Normal, Wait for user to press advance, Preset: Weak Pulse, Wait for user to press advance, Preset: Bradycardia, Wait for user to press advance, Print Header, Print Status, End Auto Sequence.

A2 Auto Sequence Control Codes

Q = Load Auto Sequence in position "nn" (Example: "Q01" = Load Auto Sequence in position 01).

E = End Auto Sequence

H = Print Header

I = Enter Alarm Limits Test Mode

K = Wait for user to press advance

W = Print status

A3 Auto Sequence Data Codes

M = Pre-loaded manufacturer's or user-defined r-curve (Example: "M01" = BCI Oxi-Pulse)

Code	Description	Code	Description
M01	BCI Oxi-Pulse	**M09**	Ohmeda
M02	Criticare	**M10**	User Defined 1
M03	Datascope	**M11**	User Defined 2
M04	Datex	**M12**	User Defined 3
M05	Novametrix	**M13**	User Defined 4
M06	Marquette Electronics	**M14**	User Defined 5
M07	Nellcor	**M15**	User Defined 6
M08	Hewlett-Packard	**M16**	User Defined 7

L = Ambient light (Example: "L01" = Normal)

Code	Description
L01	Normal
L02	50 MHz
L03	60 MHz
L04	Sun

P = Pigment (Example: "L01" = Normal)

Code	Description
P01	Low
P02	Medium
P03	High

R = Maximum and minimum ranges for QA-510 settings (Example: "R07" = PulseMax/Asystole)

Code	Description	Code	Description
R01	SpO_2 Max	**R05**	Pampl Max
R02	SpO_2 Min	**R06**	Pampl Min
R03	Rate Max	**R07**	Pulse Max
R04	Rate Min	**R08**	Pulse Min

S = SpO_2 from 35 to 100%. This is entered in three-digit format. (For example, an SpO_2 of 35% = S035)

T = Preset (Example: "T06" = Geriatric)

Code	Description	Code	Description
T01	Manual	**T05**	Tachycardia
T02	Normal	**T06**	Geriatric
T03	Weak Pulse	**T07**	Obese
T04	Bradycardia	**T08**	Motion

A = Pulse Amplitude from 0 to 100%. This is entered in three-digit format. (For example, a pulse amplitude of 10 percent = A010)

B = Rate from 0 to 300 BPM. This is entered in three-digit format. (For example, a BPM rate of 65 = B065)

D = Delay in tenths of a seconds from 1 to 999. This is entered in three-digit format. (For example, a delay of 10 seconds = D100)

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APPENDIX B: R-Curves

The following manufacturers' R-Curves have been pre-loaded into QA-510, and are provided herein for information.

B1 BCI OXI-Pulse

Make: BCI OXI-PULSE 3301 71000A1
Reference Unit Serial No.: 320014767
Date: 04.03.97

Red Gain Setting: 2048
IR Gain Setting: 1024
Level Code Setting: 101

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 0.5 V
IR Trig Threshold: 0.5 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.39	78%	1.03	56%	1.57
99%	0.46	77%	1.05	55%	1.60
98%	0.53	76%	i .07	54%	1.63
97%	0.59	75%	1.09	53%	1.66
96%	0.63	74%	1.11	52%	1.69
95%	0.66	73%	1.13	51%	1.73
94%	0.69	72%	1.16	50%	1.76
93%	0.71	71%	1.18	49%	1.80
92%	0.74	70%	1.20	46%	1.83
91%	0.76	69%	1.23	47%	1.87
90%	0.78	68%	1.25	46%	1.90
89%	0.80	67%	1.27	45%	1.94
88%	0.83	66%	1.30	44%	1.98
87%	0.85	65%	1.32	43%	2.02
86%	0.87	64%	1.35	42%	2.06
85%	0.89	63%	1.37	41%	2.10
84%	0.91	62%	1.40	40%	2.14
83%	0.93	61%	1.43	39%	2.18
82%	0.95	60%	1.45	38%	2.23
81%	0.97	59%	1.48	37%	2.27
80%	0.99	58%	1.51	36%	2.31
79%	1.01	57%	1.54	35%	2.36

B2 Criticare

Make: Criticare
Reference Unit Serial No.:
Date: 04.03.97

Red Gain Setting: 400
IR Gain Setting: 325
Level Code Setting: 101

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 0.5 V
IR Trig Threshold: 0.5 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.44	78%	1.10	56%	1.56
99%	0.50	77%	1.12	55%	1.58
98%	0.55	76%	1.15	54%	1.60
97%	0.59	75%	1.17	53%	1.62
96%	0.63	74%	1.19	52%	1.65
95%	0.66	73%	1.21	5i%	1.67
94%	0.69	72%	1.23	50%	1.70
93%	0.72	71%	1.26	49%	1.73
92%	0.74	70%	1.28	48%	1.76
91%	0.77	69%	1.30	47%	1.78
90%	0.79	68%	1.32	46%	1.81
89%	0.82	67%	1.34	45%	1.85
88%	0.84	66%	1.36	44%	1.88
87%	0.87	65%	1.38	43%	1.91
86%	0.89	64%	1.39	42%	1.95
85%	0.92	63%	1.41	41%	1.98
84%	0.95	62%	1.43	40%	2.02
83%	0.97	61%	1.45	39%	2.06
82%	1.00	60%	1.47	38%	2.10
81%	1.02	59%	1.49	37%	2.13
80%	1.05	58%	1.51	36%	2.17
79%	1.07	57%	1.53	35%	2.21

B3 Datascope Accutorr

Make: Datascope Accutorr 3 Sat
Reference Unit Serial No.: 10995F2
Date: 04.03.97

Red Gain Setting: 2048
IR Gain Setting: 1024
Level Code Setting: 110

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 2 V
IR Trig Threshold: 1 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.49	78%	1.22	56%	1.75
99%	0.53	77%	1.25	55%	1.77
98%	0.56	76%	1.28	54%	1.79
97%	0.61	75%	1.31	53%	1.81
96%	0.63	74%	1.33	52%	1.83
95%	0.67	73%	1.36	51%	1.85
94%	0.72	72%	1.38	50%	1.87
93%	0.75	71%	1.41	49%	1.89
92%	0.79	70%	1.43	48%	1.91
91%	0.82	69%	1.46	47%	1.92
90%	0.86	68%	1.48	46%	1.94
89%	0.89	67%	1.51	45%	1.96
88%	0.92	66%	1.53	44%	1.98
87%	0.96	65%	1.55	43%	2.00
86%	0.99	64%	1.58	42%	2.01
85%	1.02	63%	1.60	41%	2.03
84%	1.05	62%	1.62	40%	2.05
83%	1.08	61%	1.64	39%	2.06
82%	1.11	60%	1.67	38%	2.08
81%	1.14	59%	1.69	37%	2.10
80%	1.17	58%	1.71	36%	2.11
79%	1.20	57%	1.73	35%	2.13

B4 Datex Satlite Trans

Make: Datex Satlite Trans
Reference Unit Serial No.: 10995F2
Date: 04.03.97

Red Gain Setting: 2048
IR Gain Setting: 1024
Level Code Setting: 11

Broadband Preamp Gain: -14 dB
IR Preamp Gain: -8 dB
Broadband Trig Threshold: 1 V
IR Trig Threshold: 2 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.38	78%	1.09	56%	1.54
99%	0.47	77%	1.12	55%	1.56
98%	0.54	76%	1.14	54%	1.58
97%	0.59	75%	1.16	53%	1.60
96%	0.63	74%	1.18	52%	1.62
95%	0.67	73%	1.20	51%	1.64
94%	0.70	72%	1.22	50%	1.66
93%	0.73	71%	1.24	49%	1.68
92%	0.75	70%	1.26	48%	1.70
91%	0.78	69%	1.29	47%	1.72
90%	0.81	68%	1.31	46%	1.74
89%	0.83	67%	1.33	45%	1.76
88%	0.86	66%	1.35	44%	1.78
87%	0.88	65%	1.37	43%	1.80
86%	0.91	64%	1.39	42%	1.82
85%	0.93	63%	1.41	41%	1.84
84%	0.96	62%	1.43	40%	1.86
83%	0.98	61%	1.45	39%	1.88
82%	1.00	60%	1.47	38%	1.90
81%	1.03	59%	1.49	37%	1.93
80%	1.05	58%	1.51	36%	1.95
79%	1.07	57%	1.52	35%	1.98

B5 Hewlett-Packard

Make: Hewlett-Packard
Reference Unit Serial No.:
Date: 04.03.97

Red Gain Setting: 480
IR Gain Setting: 640
Level Code Setting: 96

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 0.25 V
IR Trig Threshold: 0.25 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.64	78%	1.29	56%	1.76
99%	0.68	77%	1.31	55%	1.77
98%	0.71	76%	1.34	54%	1.79
97%	0.74	75%	1.36	53%	1.81
96%	0.78	74%	1.38	52%	1.83
95%	0.81	73%	1.41	51%	1.85
94%	0.84	72%	1.43	50%	1.87
93%	0.87	71%	1.45	49%	1.89
92%	0.90	70%	1.47	48%	1.90
91%	0.93	69%	1.49	47%	1.92
90%	0.96	68%	1.52	46%	1.94
89%	0.99	67%	1.54	45%	1.96
88%	1.02	66%	1.56	44%	1.98
87%	1.05	65%	1.58	43%	1.99
86%	1.08	64%	1.60	42%	2.01
85%	1.11	63%	1.62	41%	2.03
84%	1.14	62%	1..64	40%	2.04
83%	1.16	61%	1.66	39%	2.06
82%	1.19	60%	1.68	38%	2.08
81%	1.21	59%	1.70	37%	2.09
80%	1.24	58%	1.72	36%	2.11
79%	1.26	57%	1.74	35%	2.12

B6 Marquette Eagle

Make: Marquette Eagle 3000
Reference Unit Serial No.: H5LA0215G
Date: 04.03.97

Red Gain Setting: 2048
IR Gain Setting: 1024
Level Code Setting: 101

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 0.5 V
IR Trig Threshold: 0.5 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.50	78%	1.06	56%	1.41
99%	0.53	77%	1.08	55%	1.43
98%	0.57	76%	1.10	54%	1.44
97%	0.60	75%	1.12	53%	1.46
96%	0,63	74%	1,13	52%	1,47
95%	0.66	73%	1.15	51%	1.49
94%	0.69	72%	1.17	50%	1.50
93%	0.72	71%	1.18	49%	1.52
92%	0.75	70%	1.20	46%	1.53
91%	0.77	69%	1.22	47%	1.55
90%	0.80	68%	1.23	46%	1.57
89%	0.83	67%	1.25	45%	1.58
88%	0.85	66%	1.26	44%	1.60
87%	0.88	65%	1.28	43%	1.61
86%	0.90	64%	1.29	42%	1.63
85%	0.92	63%	1.31	41%	1.64
64%	0.94	62%	1.32	40%	1.66
83%	0.96	61%	1.34	39%	1.67
82%	0.99	60%	1.35	38%	1.69
81%	1.01	59%	1.37	37%	1.70
80%	1.03	58%	1.38	36%	1.72
79%	1.04	57%	1.40	35%	1.73

B7 Nellcor

Make: Nellcor N-20
Reference Unit Serial No.: 207 74 771
Date: 04.03.97

Red Gain Setting: 2048
IR Gain Setting: 1024
Level Code Setting: 101

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 0.5 V
IR Trig Threshold: 0.5 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.48	78%	1.05	56%	1.40
99%	0.52	77%	1.07	55%	1.42
98%	0.55	76%	1.09	54%	1.43
97%	0.59	75%	1.11	53%	1.45
96%	0.62	74%	1.12	52%	1.46
95%	0.65	73%	1.14	51%	1.48
94%	0.68	72%	1.16	50%	1.49
93%	0.71	71%	1.17	49%	1.51
92%	0.74	70%	1.19	48%	1.52
91%	0.77	69%	1.21	47%	1.54
90%	0.79	68%	1.22	46%	1.55
89%	0.82	67%	1.24	45%	1.57
88%	0.84	68%	1.25	44%	1.59
87%	0.87	65%	1.27	43%	1.60
86%	0.89	64%	1,28	42%	1.62
85%	0.91	63%	1.30	41%	1.63
84%	0.93	62%	1.31	40%	1.65
83%	0.95	61%	1.33	39%	1.66
82%	0.98	60%	1.34	38%	1.68
81%	1.00	59%	1.36	37%	1.69
80%	1.02	58%	1.37	36%	1.71
79%	1.03	57%	1.39	35%	1.72

B8 Novametrix Oxypleth

Make:	Novametrix Oxyp!eth Model 520A
Reference Unit Serial No.:	77 - 3766LR
Date:	04.03.97
Red Gain Setting:	1030
IR Gain Setting:	1520
Level Code Setting:	10
Broadband Preamp Gain:	-14 dB
IR Preamp Gain:	-8 dB
Broadband Trig Threshold:	1 V
IR Trig Threshold:	1 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.43	78%	1.26	56%	1.76
99%	0.51	77%	1.29	55%	1.79
98%	0.59	76%	1.31	54%	1.81
97%	0.66	75%	1.34	53%	1.83
98%	0.72	74%	1.36	52%	1.85
95%	0.75	73%	1.38	51%	1.86
94%	0.78	72%	1.40	50%	1.88
93%	0.81	71%	1.42	49%	1.88
92%	0.84	70%	1.44	48%	1.88
91%	0.87	69%	1.47	47%	1.88
90%	0.90	88%	1.49	46%	1.88
89%	0.93	67%	1.51	45%	1.88
88%	0.97	66%	1.53	44%	1.88
87%	1.00	65%	1.55	43%	1.88
86%	1.03	64%	1.57	42%	1.88
85%	1.06	63%	1.60	41%	1.88
84%	1.09	62%	1.62	40%	1,88
83%	1.12	61%	1.64	39%	1.88
82%	1.15	60%	1.67	38%	1.88
81%	1.18	59%	1.69	37%	1.88
80%	1.21	58%	1.72	36%	1.88
79%	1.24	57%	1.74	35%	1.88

B9 Ohmeda OxySTAT

Make: Ohmeda OxySTAT
Reference Unit Serial No.:
Date: 04.03.97

Red Gain Setting: 480
IR Gain Setting: 640
Level Code Setting: 96

Broadband Preamp Gain: 0 dB
IR Preamp Gain: 0 dB
Broadband Trig Threshold: 0.25 V
IR Trig Threshold: 0.25 V

SpO_2	R-value	SpO_2	R-value	SpO_2	R-value
100%	0.53	78%	1.26	56%	1.77
99%	0.57	77%	1.29	55%	1.79
98%	0.60	76%	1.31	54%	1.82
97%	0.64	75%	1.34	53%	1.84
96%	0.68	74%	1.36	52%	1.86
95%	0.72	73%	1.39	51%	1.88
94%	0.76	72%	1.41	50%	1.90
93%	0.79	71%	1.43	49%	1.92
92%	0.83	70%	1.46	48%	1.95
91%	0.86	69%	1.48	47%	1.97
90%	0.90	68%	1.50	46%	1.99
89%	0.93	67%	1.53	45%	2.01
88%	0.96	66%	1.55	44%	2.03
87%	1.00	65%	1.57	43%	2.05
86%	1.03	64%	1.59	42%	2.07
85%	1.06	63%	1.62	41%	2.08
84%	1.09	62%	1.64	40%	2.10
83%	1.12	61%	1.66	39%	2.12
82%	1.15	60%	1.68	38%	2.13
81%	1.18	59%	1.70	37%	2.15
80%	1.21	58%	1.73	36%	2.16
79%	1.23	57%	1.75	35%	2.18

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APPENDIX C: LIGHT LEVEL CODES (L-CODES)

Broad Band Channel: PLUS_8dB, PLUS_0dB, MINUS_13dB, MINUS_14dB
Infrared Channel: PLUS_6dB, PLUS_0dB, MINUS6dB, MINUS_8dB
L1 = 0.25V L3 = 1V
L2 = 0.5V L4 = 2V

L(evel) Code	Broad Band Gain	Infrared Gain	Broad Band Threshold	Infrared Threshold
00	MINUS_14dB	MINUS_8dB	L1	L1
01	MINUS_14dB	MINUS_8dB	L1	L2
02	MINUS_14dB	MINUS_8dB	L1	L3
03	MINUS_14dB	MINUS_8dB	L1	L4
04	MINUS_14dB	MINUS_8dB	L2	L1
05	MINUS_14dB	MINUS_8dB	L2	L2
06	MINUS_14dB	MINUS_8dB	L2	L3
07	MINUS_14dB	MINUS_8dB	L2	L4
08	MINUS_14dB	MINUS_8dB	L3	L1
09	MINUS_14dB	MINUS_8dB	L3	L2
10	MINUS_14dB	MINUS_8dB	L3	L3
11	MINUS_14dB	MINUS_8dB	L3	L4
12	MINUS_14dB	MINUS_8dB	L4	L1
13	MINUS_14dB	MINUS_8dB	L4	L2
14	MINUS_14dB	MINUS_8dB	L4	L3
15	MINUS_14dB	MINUS_8dB	L4	L4
16	MINUS_14dB	MINUS_6dB	L1	L1
17	MINUS_14dB	MINUS_6dB	L1	L2
18	MINUS_14dB	MINUS_6dB	L1	L3
19	MINUS_14dB	MINUS_6dB	L1	L4
20	MINUS_14dB	MINUS_6dB	L2	L1
21	MINUS_14dB	MINUS_6dB	L2	L2
22	MINUS_14dB	MINUS_6dB	L2	L3
23	MINUS_14dB	MINUS_6dB	L2	L4.
24	MINUS_14dB	MINUS_6dB	L3	L1
25	MINUS_14dB	MINUS_6dB	L3	L2
26	MINUS_14dB	MINUS_6dB	L3	L3
27	MINUS_14dB	MINUS_6dB	L3	L4
28	MINUS_14dB	MINUS_6dB	L4	L1
29	MINUS_14dB	MINUS_6dB	L4	L2
30	MINUS_14dB	MINUS_6dB	L4	L3
31	MINUS_14dB	MINUS_6dB	L4	L4
32	MINUS_14dB	PLUS_0dB	L1	L1
33	MINUS_14dB	PLUS_0dB	L1	L2
34	MINUS_14dB	PLUS_0dB	L1	L3
35	MINUS_14dB	PLUS_0dB	L1	L4
36	MINUS_14dB	PLUS_0dB	L2	L1
37	MINUS_14dB	PLUS_0dB	L2	L2
38	MINUS_14dB	PLUS_0dB	L2	L3
39	MINUS_14dB	PLUS_0dB	L2	L4
40	MINUS_14dB	PLUS_0dB	L3	L1
41	MINUS_14dB	PLUS_0dB	L3	L2
42	MINUS_14dB	PLUS_0dB	L3	L3
43	MINUS_14dB	PLUS_0dB	L3	L4
44	MINUS_14dB	PLUS_0dB	L4	L1
45	MINUS_14dB	PLUS_0dB	L4	L2
46	MINUS_14dB	PLUS_0dB	L4	L3
47	MINUS_14dB	PLUS_0dB	L4	L4
48	MINUS_14dB	PLUS_6dB	L1	L1

L(evel) Code	Broad Band Gain	Infrared Gain	Broad Band Threshold	Infrared Threshold
49	MINUS_14dB	PLUS_6dB	L1	L2
50	MINUS_14dB	PLUS_6dB	L1	L3
51	MINUS_14dB	PLUS_6dB	L1	L4
52	MINUS_14dB	PLUS_6dB	L2	L1
53	MINUS_14dB	PLUS_6dB	L2	L2
54	MINUS_14dB	PLUS_6dB	L2	L3
55	MINUS_14dB	PLUS_6dB	L2	L4
56	MINUS_14dB	PLUS_6dB	L3	L1
57	MINUS_14dB	PLUS_6dB	L3	L2
58	MINUS_14dB	PLUS_6dB	L3	L3
59	MINUS_14dB	PLUS_6dB	L3	L4
60	MINUS_14dB	PLUS_6dB	L4	L1
61	MINUS_14dB	PLUS_6dB	L4	L2
62	MINUS_14dB	PLUS_6dB	L4	L3
63	MINUS_14dB	PLUS_6dB	L4	L4
64	PLUS_0dB	MINUS_8dB	L1	L1
65	PLUS_0dB	MINUS_8dB	L1	L2
66	PLUS_0dB	MINUS_8dB	L1	L3
67	PLUS_0dB	MINUS_8dB	L1	L4
68	PLUS_0dB	MINUS_8dB	L2	L1
69	PLUS_0dB	MINUS_8dB	L2	L2
70	PLUS_0dB	MINUS_8dB	L2	L3
71	PLUS_0dB	MINUS_8dB	L2	L4
72	PLUS_0dB	MINUS_8dB	L3	L1
73	PLUS_0dB	MINUS_8dB	L3	L2
74	PLUS_0dB	MINUS_8dB	L3	L3
75	PLUS_0dB	MINUS_8dB	L3	L4
76	PLUS_0dB	MINUS_8dB	L4	L1
77	PLUS_0dB	MINUS_8dB	L4	L2
78	PLUS_0dB	MINUS_8dB	L4	L3
79	PLUS_0dB	MINUS_8dB	L4	L4
80	PLUS_0dB	MINUS_6dB	L1	L1
81	PLUS_0dB	MINUS_6dB	L1	L2
82	PLUS_0dB	MINUS_6dB	L1	L3
83	PLUS_0dB	MINUS_6dB	L1	L4
84	PLUS_0dB	MINUS_6dB	L2	L1
85	PLUS_0dB	MINUS_6dB	L2	L2
86	PLUS_0dB	MINUS_6dB	L2	L3
87	PLUS_0dB	MINUS_6dB	L2	L4
88	PLUS_0dB	MINUS_6dB	L3	L1
89	PLUS_0dB	MINUS_6dB	L3	L2
90	PLUS_0dB	MINUS_6dB	L3	L3
91	PLUS_0dB	MINUS_6dB	L3	L4
92	PLUS_0dB	MINUS_6dB	L4	L1
93	PLUS_0dB	MINUS_6dB	L4	L2
94	PLUS_0dB	MINUS_6dB	L4	L3
95	PLUS_0dB	MINUS_6dB	L4	L4
96	PLUS_0dB	PLUS_0dB	L1	L1
97	PLUS_0dB	PLUS_0dB	L1	L2
98	PLUS_0dB	PLUS_0dB	L1	L3
99	PLUS_0dB	PLUS_0dB	L1	L4
100	PLUS_0dB	PLUS_0dB	L2	L1
101	PLUS_0dB	PLUS_0dB	L2	L2
102	PLUS_0dB	PLUS_0dB	L2	L3
103	PLUS_0dB	PLUS_0dB	L2	L4
104	PLUS_0dB	PLUS_0dB	L3	L1
105	PLUS_0dB	PLUS_0dB	L3	L2
106	PLUS_0dB	PLUS_0dB	L3	L3
107	PLUS_0dB	PLUS_0dB	L3	L4
108	PLUS_0dB	PLUS_0dB	L4	L1

L(evel) Code	Broad Band Gain	Infrared Gain	Broad Band Threshold	Infrared Threshold
109	PLUS_0dB	PLUS_0dB	L4	L2
110	PLUS_0dB	PLUS_0dB	L4	L3
111	PLUS_0dB	PLUS_0dB	L4	L4
112	PLUS_0dB	PLUS_6dB	L1	L1
113	PLUS_0dB	PLUS_6dB	L1	L2
114	PLUS_0dB	PLUS_6dB	L1	L3
115	PLUS_0dB	PLUS_6dB	L1	L4
116	PLUS_0dB	PLUS_6dB	L2	L1
117	PLUS_0dB	PLUS_6dB	L2	L2
118	PLUS_0dB	PLUS_6dB	L2	L3
119	PLUS_0dB	PLUS_6dB	L2	L4
120	PLUS_0dB	PLUS_6dB	L3	L1
121	PLUS_0dB	PLUS_6dB	L3	L2
122	PLUS_0dB	PLUS_6dB	L3	L3
123	PLUS_0dB	PLUS_6dB	L3	L4
124	PLUS_0dB	PLUS_6dB	L4	L1
125	PLUS_0dB	PLUS_6dB	L4	L2
126	PLUS_0dB	PLUS_6dB	L4	L3
127	PLUS_0dB	PLUS_6dB	L4	L4
128	PLUS_8dB	MINUS_8dB	L1	L1
129	PLUS_8dB	MINUS_8dB	L1	L2
130	PLUS_8dB	MINUS_8dB	L1	L3
131	PLUS_8dB	MINUS_8dB	L1	L4
132	PLUS_8dB	MINUS_8dB	L2	L1
133	PLUS_8dB	MINUS_8dB	L2	L2
134	PLUS_8dB	MINUS_8dB	L2	L3
135	PLUS_8dB	MINUS_8dB	L2	L4
136	PLUS_8dB	MINUS_8dB	L3	L1
137	PLUS_8dB	MINUS_8dB	L3	L2
138	PLUS_8dB	MINUS_8dB	L3	L3
139	PLUS_8d0	MINUS_8dB	L3	L4
140	PLUS_8dB	MINUS_8dB	L4	L1
141	PLUS_8dB	MINUS_8dB	L4	L2
142	PLUS_8dB	MINUS_8dB	L4	L3
143	PLUS_8dB	MINUS_8dB	L4	L4
144	PLUS_8dB	MINUS_6dB	L1	L1
145	PLUS_8dB	MINUS_6dB	L1	L2
146	PLUS_8dB	MINUS_6dB	L1	L3
147	PLUS_8dB	MINUS_6dB	L1	L4
148	PLUS_8dB	MINUS_6dB	L2	L1
149	PLUS_8dB	MINUS_6dB	l.2	L2
150	PLUS_8dB	MINUS_6dB	L2	L3
151	PLUS_8dB	MINUS_6dB	L2	L4
152	PLUS_8dB	MINUS_6dB	L3	L1
153	PLUS_8dB	MINUS_6dB	L3	L2
154	PLUS_8dB	MINUS_6dB	L3	L3
155	PLUS_8dB	MINUS_6dB	L3	L4
156	PLUS_8dB	MINUS_6dB	L4	L1
157	PLUS_8dB	MINUS_6dB	L4	L2
158	PLUS_8dB	MINUS_6dB	L4	L3
159	PLUS_8dB	MINUS_6dB	L4	L4
160	PLUS_8dB	PLUS_0dB	L1	L1
161	PLUS_8dB	PLUS_0dB	L1	L2
162	PLUS_8dB	PLUS_0dB	L1	L3
163	PLUS_8dB	PLUS_0dB	L1	L4
164	PLUS_8dB	PLUS_0dB	L2	L1
165	PLUS_8dB	PLUS_0dB	L2	L2
166	PLUS_8dB	PLUS_0dB	L2	L3
167	PLUS_8dB	PLUS_0dB	L2	L4
168	PLUS_8dB	PLUS_0dB	L3	L1

L(evel) Code	Broad Band Gain	Infrared Gain	Broad Band Threshold	Infrared Threshold
169	PLUS_8dB	PLUS_0dB	L3	L2
170	PLUS_8dB	PLUS_0dB	L3	L3
171	PLUS_8dB	PLUS_0dB	L3	L4
172	PLUS_8dB	PLUS_0dB	L4	L1
173	PLUS_8dB	PLUS_0dB	L4	L2
174	PLUS_8dB	PLUS_0dB	L4	L3
175	PLUS_8dB	PLUS_0dB	L4	L4
176	PLUS_8dB	PLUS_6dB	L1	L1
177	PLUS_8dB	PLUS_6dB	L1	L2
178	PLUS_8dB	PLUS_6dB	L1	L3
179	PLUS_8dB	PLUS_6dB	L1	L4
180	PLUS_8dB	PLUS_6dB	L2	L1
181	PLUS_8dB	PLUS_6dB	L2	L2
182	PLUS_8dB	PLUS_6dB	L2	L3
183	PLUS_8dB	PLUS_6dB	L2	L4
184	PLUS_8dB	PLUS_6dB	L3	L1
185	PLUS_8dB	PLUS_6dB	L3	L2
186	PLUS_8dB	PLUS_6dB	L3	L3
187	PLUS_8dB	PLUS_6dB	L3	L4
188	PLUS_8dB	PLUS_6dB	L4	L1
189	PLUS_8dB	PLUS_6dB	L4	L2
190	PLUS_8dB	PLUS_6dB.	L4	L3
191	PLUS_8dB	PLUS_6dB	L4	L4
		Customcodes:BBIR		
192	PLUS_0dB	PLUS_0dB	L3	L3
193	PLUS_0dB	PLUS_0dB	L3	L3
194	PLUS_0dB	PLUS_0dB	L3	L3
195	PLUS_0dB	PLUS_0dB	L3	L3
196	PLUS_0dB	PLUS_0dB	L3	L3
197	PLUS_0dB	PLUS_0dB	L3	L3
198	PLUS_0dB	PLUS_0dB	L3	L3
199	PLUS_0dB	PLUS_0dB	L3	L3
200	PLUS_0dB	PLUS_0dB	L3	L3
201	PLUS_0dB	PLUS_0dB	L3	L3
202	PLUS_0dB	PLUS_0dB	L3	L3
203	PLUS_0dB	PLUS_0dB	L3	L3
204	PLUS_0dB	PLUS_0dB	L3	L3
205	PLUS_0dB	PLUS_0dB	L3	L3
206	PLUS_0dB	PLUS_0dB	L3	L3
207	PLUS_0dB	PLUS_0dB	L3	L3
208	PLUS_0dB	PLUS_0dB	L3	L3
209	PLUS_0dB	PLUS_0dB	L3	L3
210	PLUS_0dB	PLUS_0dB	L3	L3
211	PLUS_0dB	PLUS_0dB	L3	L3
212	PLUS_0dB	PLUS_0dB	L3	L3
213	PLUS_0dB	PLUS_0dB	L3	L3
214	PLUS_0dB	PLUS_0dB	L3	L3
215	PLUS_0dB	PLUS_0dB	L3	L3
216	PLUS_0dB	PLUS_0dB	L3	L3
217	PLUS_0dB	PLUS_0dB	L3	L3
218	PLUS_0dB	PLUS_0dB	L3	L3
219	PLUS_0dB	PLUS_0dB	L3	L3
220	PLUS_0dB	PLUS_0dB	L3	L3
221	PLUS_0dB	PLUS_0dB	L3	L3
222	PLUS_0dB	PLUS_0dB	L3	L3
223	PLUS_0dB	PLUS_0dB	L3	L3
224	PLUS_0dB	PLUS_0dB	L3	L3
225	PLUS_0dB	PLUS_0dB	L3	L3

L(evel) Code	Broad Band Gain	Infrared Gain	Broad Band Threshold	Infrared Threshold
226	PLUS_0dB	PLUS_0dB	L3	L3
227	PLUS_0dB	PLUS_0dB	L3	L3
228	PLUS_0dB	PLUS_0dB	L3	L3
229	PLUS_0dB	PLUS_0dB	L3	L3
230	PLUS_0dB	PLUS_0dB	L3	L3
231	PLUS_0dB	PLUS_0dB	L3	L3
232	PLUS_0dB	PLUS_0dB	L3	L3
233	PLUS_0dB	PLUS_0dB	L3	L3
234	PLUS_0dB	PLUS_0dB	L3	L3
235	PLUS_0dB	PLUS_0dB	L3	L3
236	PLUS_0dB	PLUS_0dB	L3	L3
237	PLUS_0dB	PLUS_0dB	L3	L3
238	PLUS_0dB	PLUS_0dB	L3	L3
239	PLUS_0dB	PLUS_0dB	L3	L3
240	PLUS_0dB	PLUS_0dB	L3	L3
241	PLUS_0dB	PLUS_0dB	L3	L3
242	PLUS_0dB	PLUS_0dB	L3	L3
243	PLUS_0dB	PLUS_0dB	L3	L3
244	PLUS_0dB	PLUS_0dB	L3	L3
245	PLUS_0dB	PLUS_0dB	L3	L3
246	PLUS_0dB	PLUS_0dB	L3	L3
247	PLUS_0dB	PLUS_0dB	L3	L3
248	PLUS_0dB	PLUS_0dB	L3	L3
249	PLUS_0dB	PLUS_0dB	L3	L3
250	PLUS_0dB	PLUS_0dB	L3	L3
251	PLUS_0dB	PLUS_0dB	L3	L3
252	PLUS_0dB	PLUS_0dB	L3	L3
253	PLUS_0dB	PLUS_0dB	L3	L3
254	PLUS_0dB	PLUS_0dB	L3	L3
255	PLUS_0dB	PLUS_0dB	L3	L3

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APPENDIX D: ERROR REPORT FORM, PRO-Soft QA-510

PRO-SOFT QA-510 SpO_2 ANALYZER ERROR REPORT FORM

USA
1345 Monroe NW, Suite 255A
Grand Rapids, MI 49505
Phone: (+1) 888 863-8766
Fax: (+1) 616 454-3350
E-mail: *metronus@aol.com*

FRANCE
30, rue Paul Claudel
91000 Evry, France
Phone: (+33) 1 6078 8899
Fax: (+33) 1 6078 6839
E-mail: *metronfrance@infonie.fr*

NORWAY
Travbaneveien 1
N-7044 Trondheim, Norway
Phone: (+47) 7382 8500
Fax: (+47) 7391 7009
E-mail: *support@metron.no*

From: (name) Address:	Phone: Fax: Date:
PRO-Soft QA-510 Error Report	Product: Version:

Type

Wrong results	Error messages, without reason
Program stops, no reaction	Wrong responses on commands.
Other	

Description of the situation prior to the error:

Description of the error:

(METRON use internally)

Received date:	Comments:	Critical
Correction date:		Minor

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APPENDIX E: SUGGESTION FORM, PRO-Soft QA-510

PRO-SOFT QA-510 SpO_2 ANALYZER SUGGESTION FORM

USA
1345 Monroe NW, Suite 255A
Grand Rapids, MI 49505
Phone: (+1) 888 863-8766
Fax: (+1) 616 454-3350
E-mail: *metronus@aol.com*

FRANCE
30, rue Paul Claudel
91000 Evry, France
Phone: (+33) 1 6078 8899
Fax: (+33) 1 6078 6839
E-mail: *metronfrance@infonie.fr*

NORWAY
Travbaneveien 1
N-7044 Trondheim, Norway
Phone: (+47) 7382 8500
Fax: (+47) 7391 7009
E-mail: *support@metron.no*

From: (name) Address:	Phone: Fax: Date:
PRO-Soft QA-510 Improvement Suggestion	Product: Version:

Type

One window	Presentation
Several windows	Options, configuration possibilities
Documentation	Other

Description of the suggested improvement:

(METRON use internally)

Received date:	Comments:
Correction date:	
Ref No.	

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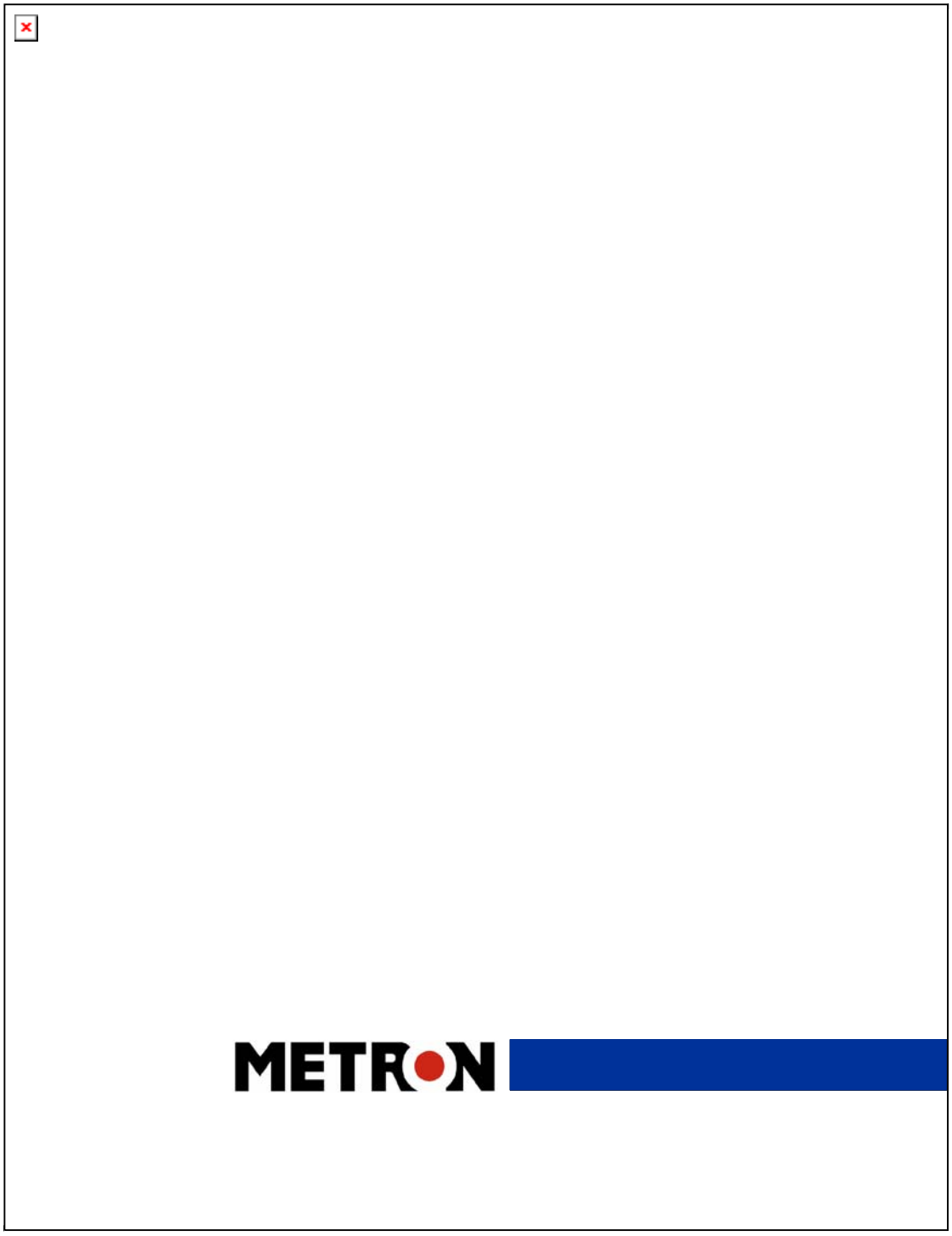
METRON